

News

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****Orthopedic surgeons
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DALLAS--The thought of long months immobilized in a cast or in traction discourages many patients when considering orthopedic surgery. Today, however, the up-to-date orthopedist may be as concerned about his patients' movement as any Olympic track coach.

Immobilizing for extended periods causes muscles to atrophy and scar tissue to contract, sometimes leading to permanent disability, says Dr. Vert Mooney, chairman of Orthopedic Surgery at The University of Texas Health Science Center at Dallas.

"These days we stress early motion and early function. To speed recovery our attention is on affecting muscle and connective tissue, the tissue surrounding bone. We repair connective tissue surgically as well as the bone, so that the bone heals efficiently. We align connective tissue so joints and tendons move smoothly. In addition, we want to know how connective tissue responds to mechanical stress so we can better guide healing," Mooney says.

Research projects within the health science center Orthopedic Division concentrate on pioneering ways to repair connective tissue, bone and muscle:

1. "Continuous passive motion," CPM, is being examined by orthopedic researchers, including two visiting scientists from the University of Kobe Medical School in Japan, as a possible solution for severe joint pain. Explosive pain often results when an arthritic, stiff or infected joint moves suddenly. CPM is constant, slow joint movement using a motorized support to provide a near-painless range of motion for a joint and surrounding tissue. Patients benefit most from CPM when it's used after surgery since it prevents adhesions, allows for more complete repair of cartilage, protects against arthritic changes around the joint and even helps heal joint infections, says Mooney. While the use of CPM after surgery is relatively common, questions exist on how much motion is beneficial and what the timing of motion should be.

2. Back surgery is the least predictable of orthopedic surgeries, says Mooney, since pain can persist even after surgery due to scar tissue pressing on nerves. To avoid surgery two opposite means of physical activity exist to help treat the painful back. Flexion traction bends the body forward as much as possible and hyperextension exercises bend the body backwards as much as possible. "Both work for some people, but we are working to sort out which is better for which patient," says Mooney.

3. Some patients avoid back surgery with injections of materials that dissolve troublesome areas in diseased discs. The orthopedic group is investigating the difference between two materials that for some patients are better than surgery. The two materials, chymopapain (an enzyme found in papayas) and collagenase (a body enzyme used for 15 years in debriding burns), attack different types of diseased tissue. Chymopapain affects the jelly part of the disc while collagenase affects the fibrous part. Chymopapain seems to work better in easing pain, says Mooney, but collagenase can be used repeatedly and has never caused an allergic reaction as chymopapain sometimes has.

4. A machine to measure strength of back and trunk muscles is being tested by UTHSCD researchers, among them orthopedic surgeon Dr. Tom Mayer. This unit, one of three such experimental machines made by Cybex, is proving valuable in determining the extent of back injuries after an accident or disease and in showing young sports-minded individuals whether their strength meets athletic requirements.

5. Innovative, temporary and adjustable prostheses for amputees have been studied by the Orthopedic Division. It has been found that those fitted early after amputation with a temporary prosthesis, usually made of plaster, do better than those who wait. Fitting the patient early can allow the stump to mature faster and controllably so that a permanent prosthesis is more successful and comfortable. Patients who wait have more

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difficulty with the stump changing size and often a correct fitting permanent prosthesis is not feasible. Also, older people who wait become weaker physically and may develop a joint contracture. They often feel they can't walk on a prosthesis. Fitting early with adjustable temporary prostheses can avoid these problems.

6. Patients with one leg longer than the other because of birth defects or trauma are the interest of Dr. Ken Johnson. Johnson uses an interlocking nail within the femur (thigh bone) to help the bone heal faster and better than with other means, he says. Using X-rays, the surgeon guides a rod down the marrow canal of the femur. In the case of leg shortening, excess bone can be cut and removed by inserting a cutting device into the bone and then cutting it from the inside. In bone shortening procedures and in trauma, a nail is placed and secured by interlocking it with small bolts above and below the cut. The femur heals around the nail -- in trauma cases the rod forms a strut around which pieces of broken bone can heal.

7. New bone graft substances are also under investigation by members of the orthopedic group. Dr. Robert Bucholz, vice chairman of Orthopedics, is testing a form of South Pacific coral called "hydroxyapatite," which has been converted to our bone mineral. This material can be grafted into bone damaged by trauma. Coral of this type, first investigated by plastic surgeons at the health science center for facial reconstruction, has a structural configuration similar to bone.

8. "Porous coated" hip and knee replacements are being used by Bucholz and others. Artificial joint replacements are coated with tiny metallic beads. The advantages to porous coating is that bone cement is not needed. Bone cement has caused some problems, says Bucholz, and when weakened, can cause artificial joints to loosen.

9. Sound vibrations are revealing the extent of bone healing after a fracture, Bucholz says. Doctors usually use serial X-rays to decide when the bone is healed, or they gently bend the bone at the point of fracture. But X-rays cannot tell the mechanical state of a bone -- that is, the bone's ability to bear weight and endure the stress of walking so that a cast can be safely removed, says Bucholz. Mark Strauss, a biomedical engineering student at The University of Texas at Arlington, is testing ways of predicting when a fracture is healed. Healthy bone vibrates differently from broken bone, he says. Vibration of the tibia is tested by tapping the base with a small mallet and measuring the vibrations with an accelerometer. The accelerometer changes the vibrations into an electronic signal that is recorded and stored in a computer.

10. Dr. James Montgomery, one of the physicians who has worked with the U.S. Olympic Ski Team, specializes in sports medicine and in restoring injured athletes to their optimal function in the least amount of time. "The athlete has a higher level of activity than a normal person. Correcting an athletic injury takes early fixation and early mobilization of the injury. The longer a person is immobilized, the more muscle atrophy occurs and the longer it takes to return to function," he says.

11. Hemophilia patients can have special orthopedic problems, says orthopedist Dr. Marybeth Ezaki, member of a health science center hemophilia team. Recurrent bleeding into a joint becomes destructive to the surfaces of the joint and, besides being painful, may cause deformity and loss of function. These are areas that can call for special help from the orthopedic surgeon. Bracing and strengthening are important aspects of joint care and surgery is sometimes necessary.

12. Reconstructive orthopedics, including joint replacements of the hip and knee and revisions of failed joint replacements, is being performed by Dr. Frank Gottschalk using uncemented artificial joints on many patients. Uncemented joint replacements are particularly beneficial for younger patients in whom cemented implants can be predicted to loosen and require replacement. Also, in other patients, in preference to artificial joints and for correcting deformities, he performs an "osteotomy" procedure in which bone is cut and realigned into a functional position. The bone is held together with plates and screws so the patient doesn't have to go into a cast. This procedure has the potential of lasting up to 10 years, he says, if done correctly.

"Surgeons ideally are trying to put themselves out of business," says Mooney. "If we can understand the disease, then possibly we can find a way to control the disease before a patient needs surgery."

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